

Appendix A

Checklist for Structural Design of Closure Structures

A-1. Reconnaissance Phase

a. Visit site with design team.

b. With project design engineer, determine general opening size.

c. With project design engineer, geotechnical engineer, hydraulic engineer, construction engineer, and operations engineer, assess potential alternatives using historical data and engineering judgment as to their practicality to construct, operate, and maintain.

(1) Ungated closure, sandbag closures, ramps, etc.

(2) Stoplog closure.

(3) Gated closure.

d. Identify structural engineering and design efforts and costs for the feasibility phase.

A-2. Feasibility Phase

a. Request foundation information from geotechnical engineer.

(1) Angle of internal friction.

(2) Cohesion.

(3) Adhesion.

(4) Unit weight of soil.

(5) Allowable bearing pressure.

(6) Modulus of subgrade reaction.

(7) Top of rock elevation.

(8) Groundwater elevation.

(9) Pile foundation data.

b. Determine design criteria, design assumptions, and load cases.

(1) EM 1110-2-2104.

(2) EM 1110-2-2105.

(3) EM 1110-2-2703.

(4) EM 1110-2-2502.

(5) EM 1110-2-2906.

c. With project design engineer, refine opening dimensions.

(1) Reduce width to minimum.

(2) Raise sill elevation as high as possible.

(3) Determine sill and approach slab geometry.

(4) Determine overhead clearance.

(5) Determine sight distance and geometry.

(6) Determine requirements for sidewalks and guardrails.

d. With project design engineer, assess alternatives and propose best alternative.

(1) Stoplogs.

(2) Panels.

(3) Miter gate.

(4) Overhead trolley gate.

(5) Swing gate.

(6) Roller gate.

(7) Double gate.

(8) Other gate.

e. Prepare preliminary design to the level necessary to prepare a baseline cost estimate. Present design to project engineer to be given to cost engineer.

(1) Design main structural members.

(2) Size abutments and sill and perform stability analysis.

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(3) Prepare preliminary pile design if needed.

(4) Prepare quantities.

f. Identify structural engineering and design efforts and costs for preparing design memorandum (DM) and/or plans and specifications (P&S).

g. With engineers from other Engineering Division elements and Construction Division, establish design and construction schedule.

h. Provide input for feasibility report to project engineer.

(1) Technical basis for selection of gate and abutments including general configuration, material, and foundation.

(2) Criteria and assumptions.

(3) Design computations.

(4) Brief description of any additional special analyses required for DM and/or P&S.

A-3. Design Memorandum

a. Review design criteria, design assumptions, and load cases.

(1) EM 1110-2-2104.

(2) EM 1110-2-2105.

(3) EM 1110-2-2502.

(4) EM 1110-2-2703.

(5) EM 1110-2-2906.

b. Continue design.

(1) Refine sill configuration.

(2) Design secondary structural members.

(3) Refine foundation pile design.

(4) Design reinforcing steel for abutments and sill.

(5) Design other appurtenances.

(6) Coordinate design with Safety and Security offices.

(7) Verify availability of materials.

(8) Check criteria, assumptions, and computations.

c. Provide input for design memorandum to project engineer.

(1) List basic data and criteria used.

(2) Prepare computations to determine use, adequacy, shape, and stability of critical sections.

(3) Participate in value engineering studies.

A-4. Plans and Specifications

a. Complete design.

(1) Design details.

(2) Refine and verify dimensional details.

(3) Complete drawings.

(4) Provide technical input for specifications.

(5) Prepare quantities and submit to project engineer to be forwarded to cost engineer.

(6) Check computations, plans, specifications, and quantities.

(7) Revise in accordance with review comments.

b. Participate in value engineering studies.

c. Provide technical assistance to other members of design team as requested.

A-5. Construction Phase

a. Review shop drawings.

b. Make site visits as scheduled and required.

c. Provide assistance in Requests for Information, claims, and modifications when requested.

d. Provide input into operation and maintenance manual.

e. Prepare as-built drawings.

A-6. Operations Phase

Depending on Local Cooperative Agreement and project purpose:

a. Participate in periodic inspections.

b. Modify as-built drawings.

c. Review operational drawings.

d. Correct project deficiencies as required.

e. Evaluate and design replacement features as required.